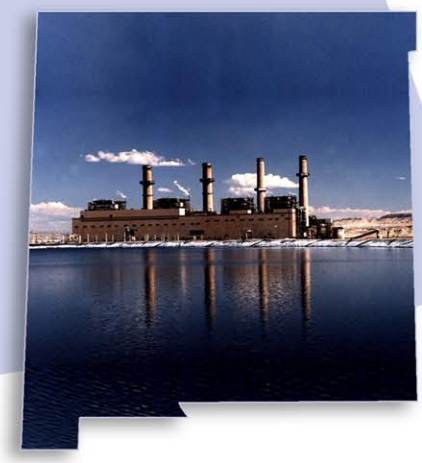

New Mexico Water for Energy

ZERONET

ZeroNet *At A Glance*

Why ZeroNet?

- Thermoelectric power provides 72% of the nation's energy, a market share unlikely to be supplanted in the near future.
- The thermoelectric power industry (coal, gas, nuclear) requires as much water as the agriculture industry.
- Electricity demand is increasing; water supplies are not.

Challenge—Provide affordable, reliable electricity to meet increasing future demand without using more water than is used today.

Goal—Develop and deploy science and technology to

- retrofit existing power plants for low-water operation;
- increase water supply through new water treatment technologies;
- understand, predict, and plan for shortages of supply due to climate and drought dynamics.

Science-Based Solutions—ZeroNet will provide

- solutions to both supply and demand sides of the water budget for power;
- water-saving cooling technologies that reduce freshwater demand;
- technologies to treat and use currently unused degraded water sources;
- prediction tools to assess the impact of climate on supply;
- decision tools to optimize water use across all sectors.

The Partnership

- Los Alamos National Laboratory—national resource for science and technology innovation
- PNM—real-world industry test bed
- EPRI—energy industry consortium with experience implementing scientific and technological solutions for the power industry.

The ZeroNet Challenge

Thirty-nine percent of the nation's freshwater withdrawals are used for thermoelectric power generation (coal, gas, nuclear). New technologies that reduce this amount could have an enormous positive impact on the nation's water supply. Developing such technologies is the goal of the ZeroNet Initiative. ZeroNet also addresses the critical scientific challenges in understanding and planning for drought. Monitoring test-beds and modeling tools are needed to provide the information necessary to understand climate-landscape interactions, to predict short and long-term water supply levels, and to effectively manage potential water shortages.

Approach

ZeroNet will deploy and demonstrate the best industry practices for conserving freshwater in power production today while developing the science and technology for low- or no-freshwater generation systems of tomorrow. The ZeroNet partnership between Los Alamos National Laboratory (LANL), the Electric Power Research Institute (EPRI), and PNM (New Mexico's largest electricity and natural gas provider) provides a unique opportunity to develop and test EPRI and LANL innovations at PNM-operated facilities. EPRI's access to the power industry through its 50 nationwide members ensures widespread deployment of ZeroNet's advances. In addition, the ZeroNet partners are already engaging New Mexico universities and Sandia National Laboratories to ensure the broadest science and technology base for the project.

ZeroNet will leverage PNM planned investment in a produced water pipeline and treatment pilot project to test emerging LANL (and other cutting edge) hydrocarbon removal and desalination treatment

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PNM — A personal commitment to New Mexico

EPRI

technologies,
in conjunction with EPRI-
sponsored cooling processes. PNM serves
as the test utility for new technologies and applications
developed by LANL and EPRI that can ultimately be applied throughout
the power industry. PNM has been and will continue to provide staffing
and financial resources support to LANL and EPRI at PNM facilities.

Through ZeroNet, New Mexico is able to demonstrate leadership in developing and applying innovative solutions to ensure a sustainable power supply in water-restricted regions that span much of the United States. A vigorous economy depends on reducing freshwater demand by the power sector, and ZeroNet-New Mexico is the model for achieving this goal throughout the industry.

Goals and Outcomes

The goals of ZeroNet include

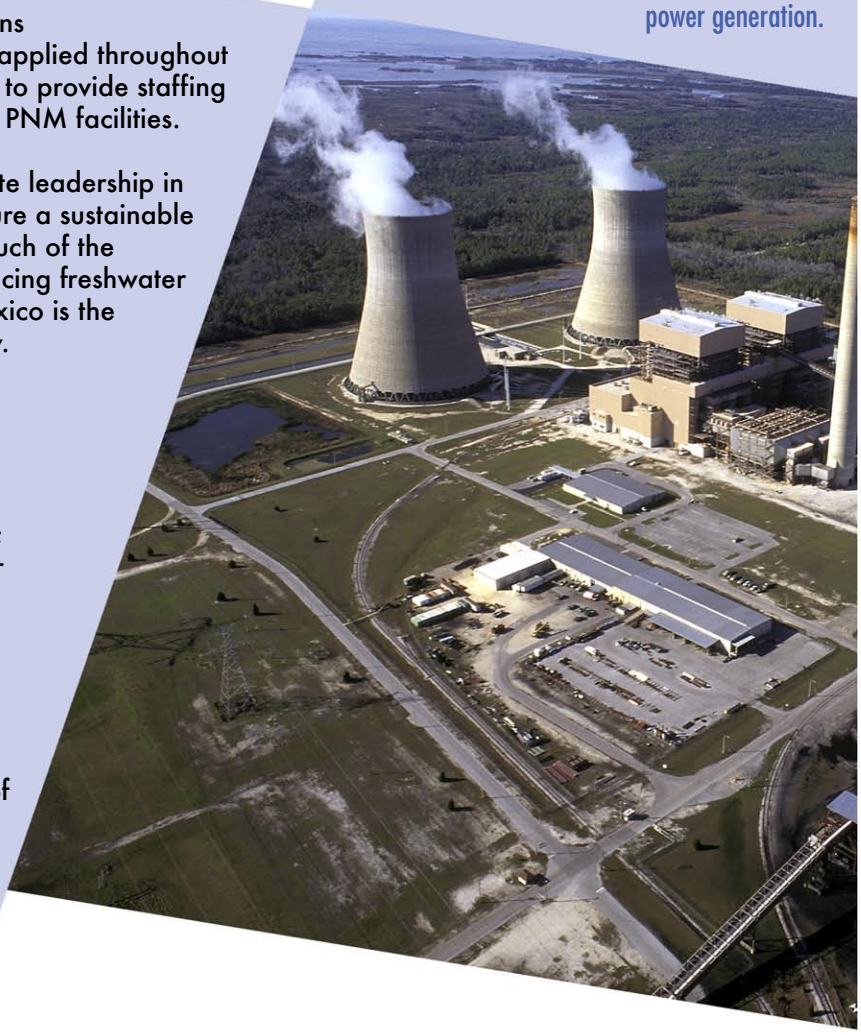
- reducing overall water use in cooling processes;
- augmenting freshwater with degraded water for cooling;
- identifying new generation water treatment technologies that provide improved recovery rates and lower operating costs for existing and alternative water resources.

Additional outcomes include

- a framework for quantifying the water budget of a basin under a range of climate scenarios;
- assessment of the impact of water conservation technology and new water sources (produced water) on the overall freshwater budget for the basin;
- quantification of the impacts of vegetation die-off (e.g., regional die-off of Pinon trees), vegetation management (thinning), and wildfire on regional hydrologic processes.

ZeroNet will provide critical water supply and demand information and reporting to water owners and managers in a decision framework to assist in planning for shortages. The team will work closely with the U.S. Bureau of Reclamation and U.S. Army Corps of Engineers to ensure that ZeroNet fills critical gaps in existing water management tools.

Vast amounts of cooling water are essential for condensing steam in thermoelectric power generation.



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